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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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Veit Stegmann

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EXAMINER

CUTLIFF, YATE KAI RENE

ART UNIT

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/570,765	Applicant(s) STEGMANN ET AL.	
	Examiner YATE' K. CUTLIFF	Art Unit 1621	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 February 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1 - 19 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1, 3-16 and 19 is/are rejected.
- 7) ☒ Claim(s) 2, 17 and 18 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>2/20/2008 & 3/26/2008</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claim 1 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

3. In Claim 1 at line 4, the term "and" was added after "and". It makes the claim unclear and confusing to have the second "and".

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 1, 3, 4, 6, 7, 11, 13, 14 and 15 are rejected under 35 U.S.C. 102(b) as being anticipated by Shin Etsu Chem CO Ltd. (JP 56-150026) (Shin)[see 1449], and TCI Europe N.V.(Abstract 1999).

6. The rejected claims cover, inter alia, a process for preparing haloalkanes comprising reacting alcohol with hydrogen halide, wherein the reaction of the alcohol with the hydrogen halide occurs in the presence of an ionic liquid at a temperature which is above 100°C for at least part of the time and, at least at the

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time of commencement of the reaction, the water content is not more than 25 mol% based on the amount of ionic liquid, where the ionic liquid is not octyltrimethylammonium chloride. The reaction temperature can be 110°C to 150°C. The hydrogen halide can be HCl or HBr, the ionic liquid may consist of cation of pyridine and an anion that is a halide. The ionic liquid can be a N-methylpyridinium and a halide. The ionic liquid has a melting point of less than 150°C, the molar ratio of ionic liquid to OH group is 1 to 3 mol. The commencement of the reaction it is carried out in the absence of water or substantial absence of water, and the water produced by the reaction is continuously removed.

7. Shin discloses a process for making methyl chloride by reacting gaseous methyl alcohol and hydrogen chloride gas in the presence of N-methylpyridinium chloride (ionic liquid (a) where $R_7 = CH_3$, $R_1-R_6 = H$, & anion is Cl^-). The reaction temperature is 150°C. The by-product water is condensed and separated. Further, Shin is silent with regard to the addition of water at the commencement of the reaction, however, the other reactants are passed into the reaction vessel in the gaseous form at the commencement of the reaction, therefore, it is implied that the reaction is carried out in the absence of water. Carrying out the reaction in the absence of water means that the water content of Shin, at least at the commencement of the reaction is less than 25%. The only water mentioned in Shin is the water that is formed as a result of the reaction. The water of reaction is continuously removed after being condensed in the continuous reaction process of Shin. Further, from the information provided in the

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table the ratio of ionic liquid to OH group appears to be about 2 to 1. (see English translation of Example and table provided with 1449).

8. Additionally, Shin discloses that at the onset of the process, after the reaction vessel is charged with the N-methylpyridinium chloride, nitrogen gas is supplied to the system.

However, in drafting the claim Applicant chose not to use the clearly exclusive transitional phrase “consisting of” which would have directed the Examiner to review the claims in a manner that would have excluded any other element, step or ingredient not specified in the claim. Instead Applicant’s claim 1 recites “wherein the reaction of the alcohol with the hydrogen halide occurs in the presence of an ionic liquid...” which raises a question as to the limiting effect of the claim language. In *Ex parte Grasselli* the Board held: Claim which recites “a catalyst wherein atomic ratios of elements are described by formula,” rather than using clearly exclusive language such as “a catalyst consisting of,” is on its face subject to more than one interpretation, and thus does not avoid prior art. *Ex parte Grasselli, et al.*, 231 USPQ 395 (Bd. Pat. App. & Int. 1983).

9. TCI discloses that the melting point of N-methylpyridinium chloride is 144°C, which is less than 150°C.

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which

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said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

11. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

12. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

13. Claims 1, 5, 8, 9, 10, 16 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shin Etsu Chem CO Ltd. (JP 56-150026) (Shin)[see 1449] in view of Metz et al. (US 5,767,330).

14. The rejected claims cover, inter alia, a process for preparing haloalkanes. Applicant is directed to the discussion above in paragraph 6 above for a detailed discussion of the claimed invention. The rejected claims set out various alcohols

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selected from a group of alcohols having one or more than one OH group for use in the reaction process of claim 1. Further, the rejected claims state that the haloalkane is isolated from the reaction mixture by distillation. The water that is continuously removed from the reaction can be removed by distillation. Lastly, the process as disclosed is capable of being carried out where the reaction alcohol is any alcohol having more than one OH group.

15. Shin's process uses a bubble plate column, in a continuous process, to produce methyl chloride at high yield and purity. The process may use hydrogen chloride in the presence of a quaternary ammonium halide salt, which is preferably a quaternary salt of pyridine. In Shin the by-product gases from the top of the reaction vessel were condensed and separated. The by-products of the condensing process were water, unreacted methyl alcohol and hydrogen chloride. The methyl chloride formed was collected in a liquid form in a trap.

Shin fails to disclose the following: the use of 2-ethylpyridinium chloride, isolation of the haloalkane by distillation, removal of water by distillation, and the reaction using alcohols with more than one OH group.

However, with regard to the use of 2-ethylpyridinium chloride its use is within the purview of the skilled artisan because 2-ethylpyridinium chloride is a quaternary salt of pyridine and Shin broadly implies that any quaternary salt of pyridine is useful in the reaction to produce its methyl chloride. Therefore, it would have been obvious to one skilled in the art at the time the claimed invention was made to substitute 2-ethylpyridinium chloride for the N-methylpyridinium chloride in the claimed process.

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One skilled in the art would have been motivated to make the change to include the 2-ethylpyridinium chloride in the reaction process because Shin states that quaternary salts of pyridine are useful in a reaction to make methyl chloride where the reactants are methyl alcohol and hydrogen chloride.

With regard to the isolation of the haloalkane by distillation and the removal of water by distillation, the process of Shin is a continuous reaction process with ongoing separation of the gases and liquid formed by the reaction. It is within the purview of the skilled artisan to expect that in a reaction system such as Shin where a mixture is continuously fed into an industrial type of reaction process, which includes a condenser, that some distillation can be deemed to occur. Therefore, it is within the purview of a person of ordinary skill in the art of industrial chemical processing to expect that a distillation step would have been included in the process of Shin. These limitations are deemed to be obvious absent a showing of unexpected results.

A reference is good not only for what it teaches by direct anticipation but also for what one of ordinary skill in the art might reasonably infer from the teachings. (*In re Opprecht* 12 USPQ 2d 1235, 1236 (Fed Cir. 1989); *In re Bode* 193 USPQ 12 (CCPA) 1976). In light of the forgoing discussion, the Examiner concludes that the subject matter defined by the instant claims would have been obvious within the meaning of 35 USC 103(a). From the teachings of the references, it is apparent that one of ordinary skill in the art would have had a reasonable expectation of success in producing the claimed invention. Therefore, the invention as a whole was *prima facie* obvious to one of ordinary skill in the art

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at the time the invention was made, as evidenced by the references, especially in the absence of evidence to the contrary.

With regard to the use of an alcohol in the process that has more than one OH group, such as 1,2-ethanediol or 1,2-propanediol, would be within the purview of the skilled artisan, since a 1,2-ethanediol and 1,2-propanediol share similar properties to the methanol. Additionally, Metz et al. was faced with the problem of finding a simplified process for making haloalkanes from alcohols while obtaining high space/time yields. Metz et al. reaction solved the problem by using amine hydrohalide pyridine salt, dehydrated by preheating, with alcohols having one OH group and more than one OH group. The Metz et al. reaction was successful for the production of alkyl chlorides with an alcohol with a single OH group and was successful for the production of di-alkyl chlorides from diols. It would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to substitute a diol for an alcohol with a single OH group in the process for making haloalkanes.

One of ordinary skill in the art would have been motivated to use other alcohols with more than one OH group because when amine hydrohalide pyridine salts were used in a similar process for making di-alkyl chlorides, such as Metz et al. each of the OH groups were replaced by the halogen.

Therefore, the invention as a whole was *prima facie* obvious to one of ordinary skill in the art at the time the invention was made, as evidenced by the references, especially in the absence of evidence to the contrary.

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16. Claims 1, 11 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shin Etsu Chem CO Ltd. (JP 56-150026) (Shin)[see 1449], and Sigma-Aldrich (catalog pages 1-3, 14 & 21).

17. The rejected claims cover, inter alia, a process for preparing haloalkanes. Applicant is directed to the discussion above in paragraph 6 above for a detailed discussion of the claimed invention. Further, the process includes the use of ionic liquids with melting points less than 100°C.

18. Shin's processes uses hydrogen chloride in the presence of a quaternary ammonium halide salt, which is preferably a quaternary salt of pyridine. Applicant is directed to paragraphs 7 and 15 for a full description of Shin.

Shin fails to disclose that the quaternary salt of pyridine has a melting point less than melting points less than 100°C.

However, Sigma-Aldrich discloses ionic liquids with a pyridine base that have a melting point of less than 100°C i.e. 1-butyl-4-methylpyridinium tetrafluoroborate and 1-butyl-4-methylpyridinium hexafluorophosphate. (see catalog pages 14 and 21). Since Shin broadly implies that any quaternary salt of pyridine is useful in the reaction to produce the methyl chloride, and ionic liquids having a pyridine base with a melting point of less than 100°C are disclosed by sigma-Aldrich, it is within the purview of the skilled artisan to use ionic liquids with this property in the process for making haloalkanes. Therefore, it would have been obvious to one skilled in the art at the time the claimed invention was made to use an ionic liquid having a melting point of less than 100°C in the claimed process.

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One skilled in the art would have been motivated to make the change to include an ionic liquid with a melting point of less than 100°C in the reaction process because Shin states that quaternary salts of pyridine are useful in a reaction to make methyl chloride where the reactants are methyl alcohol and hydrogen chloride.

Therefore, the invention as a whole was *prima facie* obvious to one of ordinary skill in the art at the time the invention was made, as evidenced by the references, especially in the absence of evidence to the contrary.

Allowable Subject Matter

19. Claim 2, 17 and 18 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

20. The following is a statement of reasons for the indication of allowable subject matter. The novelty of the process is in the use of ionic liquids which are comprised of C3-C18 mono-substituted pyridinium cations, di-substituted pyridinium cations and imidazolium cations; and anions of halides, acetate, methanesulfonate, tosylate, sulfate, hydrogensulfate, phosphate, hydrogenphosphate, dihydrogenphosphate, dialkylphosphate and bis(trifluoromethylsulfonyl) imide.

Response to Arguments

21. Applicant's arguments with respect to claim 1, 3-16 have been considered but are moot in view of the new ground(s) of rejection.

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22. Applicant's arguments in the Amendment, filed February 20, 2008, with respect to claims 2, 17 and 18 have been fully considered and are persuasive.

The 102 and 103 rejections of claims 2, 17 and 18 have been withdrawn.

23. Applicant's amendment to claim 6 filed February 20, 2008 is acknowledged and the objection to claim 6 has been withdrawn.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to YATE' K. CUTLIFF whose telephone number is (571)272-9067. The examiner can normally be reached on M-TH 8:30 a.m. - 5:00 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Yvonne Eyler can be reached on (571) 272 - 0871. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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